321-M FUEL FABRICATION FACILITY

LARGE SCALE DEMONSTRATION & DEPLOYMENT PROJECT

FINAL REPORT

Technical Task Plan No. SR-08-DD-21

Date Submitted: December 29, 1999

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EXECUTIVE SUMMARY

This report details the Large Scale Demonstration & Deployment Project (LSDDP) conducted at Savannah River Site (SRS) 321-M Fuel Fabrication Facility. The LSDDP was conducted at SRS during the period of April 1998 to December 1999 to comprehensively demonstrate and evaluate selected deactivation and decommissioning (D&D) technologies.

This final report describes the framework for completing the project, provides an historical summary of the work performed, and addresses the lessons learned on the project.

The primary products (paper) of the 321-M LSDDP were the Innovative Technology Summary Reports (ITSRs). These ITSRs provide a means for technology developers to summarize their technologies, potential applications, cost and performance data, and other pertinent information concisely and consistently. A principal goal of the ITSRs is to help site (DOE) decision makers judge the innovative technology's potential for implementation at their sites.

An Integrating Contractor Team (ICT) was assembled that consisted of representatives from the M&I contractor, D&D vendor companies, academia, and the Department of Energy (DOE). This team ensured the highest benefit to the DOE and D&D industry from the technologies demonstrated and/or deployed. Utilizing the Internet, periodic teleconference calls, and team meetings, the ICT successfully supported the project from various locations across the United States.

The ICT chose D&D technologies in the categories of characterization, decontamination and dismantlement. These technologies were demonstrated and compared against the current baseline technologies in the areas of performance and cost. In most cases, the improved and innovative technologies provided a higher degree of worker protection and comfort, a decrease in activity duration, lower costs, more efficient operation, and/or lower waste volumes. In accordance with the 321-M LSDDP Technical Task Plan, five technologies were required to be demonstrated. The technologies chosen by the ICT include: Long Range Alpha Detection (LRAD) System, Portable X-Ray, K-Edge Heavy Metal Detector, ALARA 1146 Strippable Coating, E-PERM Alpha Surface Monitor, and the Size Reduction Machine.

A one-page Pre-Demonstration Fact Sheet and a two-page Post-Demonstration Fact Sheet were provided for each of the innovative technologies. In addition, Innovative Technology Summary Reports provide detailed summaries of the new technologies and contrasted them against their baselines.

Additional means for transferring technology information included: a web site; conferences, seminars, and technology exchange meetings; magazine articles and D&D periodicals; D&D industry expert advocacy, Media Day, and technology display boards that attracted & conveyed key information to a broad audience.

In summary, the LSDDP provided an efficient and effective means of demonstrating, chronicling, and facilitating the deployment of innovative technologies throughout the DOE-complex and the D&D industry, in general.

1.0 INTRODUCTION

A large-scale technology demonstration project was conducted at the Savannah River Site's321-M Fuel Fabrication Facility from April 1998 to December 1999. The project was officially titled, "321-M Fuel Fabrication Facility Large Scale Demonstration & Deployment Project". The Technical Task Plan project number was SR-08-DD-21. The 21-month project demonstrated five new technologies and compared the performance and cost results from these technologies to selected baseline technologies.

Funding for the Large Scale Demonstration & Deployment Project (LSDDP) was facilitated through a joint agreement between EM-50 and EM-60. The arrangement was for the demonstration project to be conducted within the boundaries of the 321-M Deactivation Project and support the facility's end-state vision. The end-state vision for the project was to eliminate the radiological buffer areas and eliminate or stabilize the contamination areas in the building. The Office of Science and Technology (EM-50) would fund the demonstration project to a level similar to the EM-60 deactivation funding level. EM-50 funding for the technology demonstrations totaled $1.3M. The demonstration project ran concurrently with the deactivation project and as such, contributed greatly to realizing project goals.

The Department of Energy – Savannah River Site (DOE-SR) and the Department of Energy – National Energy Technology Laboratory (NETL) provided oversight for the large scale demonstration project. The D&D Focus Area (DDFA) was the arm of the DOE-NETL organization that provided day-to-day management of the project.

To accomplish the objectives of the LSDDP, a group representing DOE, the D&D industry, and academia was contracted to assist the project. This body was called the Integrating Contractor Team (ICT). The ICT provided direction for four phases of the LSDDP:

Phase 1	Technology Identification, Assessment, and Selection
Phase 2	Procurement and Other Steps to Start Demonstrations
Phase 3	Technology Demonstrations: Collect/Analyze Data on Baseline versus Innovative Technologies
Phase 4	Preparation of Fact Sheets, Innovative Technology Summary Reports (ITSRs) and the Final Project Report.

Technology demonstrations were conducted in three D&D categories: Characterization, Decontamination, and Dismantlement. The main hazard in the 321-M Facility was highly enriched uranium (HEU). The characterization technologies were selected because of their ability to find and quantify the HEU. The decontamination technology was selected because it could remove the HEU. The dismantlement technology would provide a better, more cost effective method of reducing low level waste volumes during the deactivation.

The characterization technologies included:

- Long Range Alpha Detection (LRAD) System
- X-Ray, K-Edge Heavy Metal Detection System
- E-PERM Alpha Surface Monitor.

The LRAD system determined the surface contamination levels on tools and small components contaminated with highly enriched uranium. This measurement technique was an improvement over the traditional probe and smear technique. The X-Ray, K-Edge system photographed HEU deposits inside exhaust ventilation ducts and accurately quantified the holdup material. These measurements were about an order of magnitude more precise than the baseline assay method. Finally, electret ionization chambers were used to determine surface contamination levels with minimal exposure of the operator to the contaminated surroundings. The E-PERM ionization disks were an improvement over the traditional method of probe and smear.

The decontamination technology demonstrated on the 321-M LSDDP was the ALARA 1146 Strippable Coating. This strippable coating realized decontamination factors (DFs) equal to the steam vacuum cleaning technology and manual wipe and clean efforts. Its extremely low mobilization cost made strippable coatings the preferred decontamination technology for smaller jobs.

The dismantlement technology chosen for the LSDDP was the Size Reduction Machine (SRM). The SRM was compared against a portable band saw (PBS) and a hand held shear (HHS). For all three cases, thin-walled components, heavy structural shapes, and overhead fixed items, the SRM preformed cuts in less time than the baseline cutting technologies. For thin-walled components and overhead fixed items, the SRM unit costs ($/cut) were significantly lower than the unit costs for the portable band saw and the hand held shear. The SRM was comparable to the baseline technologies when cutting the heavy structural shapes.

The 321-M LSDDP team interfaced with the Facilities Decommissioning Division (FDD), which was responsible for the deactivation of the 321-M Facility. To the maximum extent possible, the 321-M Deactivation Plan and divisional D&D procedures were used to facilitate and control the demonstrations. The demonstrations were conducted within the current safety and environmental envelope, minimizing mobilization/demobilization costs and allowing demonstrations to commence in a relatively short time frame.

2.0 LSDDP OBJECTIVES & ORGANIZATION

2.1 Purpose

The purpose of the 321-M LSDDP was to: evaluate prospective technologies, select innovative or new and improved “field test ready” D&D technologies, demonstrate those technologies in a large scale demonstration environment, and compare the results against existing commercial baseline technologies. The purpose was also to show that significant benefits can be achieved through the utilization of enhanced D&D technologies, or to verify that existing baseline technology practices are more cost effective.

The 321-M LSDDP demonstrated D&D technologies at the 321-M Fuel Fabrication Facility not only to benefit ongoing 321-M deactivation activities, but also to benefit broader DOE and commercial sector needs.

The Department of Energy – Savannah River Site (DOE-SR) and the D&D Focus Area (DOE-NETL) provided oversight for the large scale demonstration project. The Integrating Contractor Team (ICT), a body formed to manage the technology portion of the project, reported to DOE-SR and the D&D Focus Area. The ICT selected, prioritized, demonstrated, and evaluated technologies against project baselines. Technology performance was documented to qualify the technologies for commercialization and/or future use within the DOE Complex.

The selected innovative technologies ultimately covered three technology demonstration categories:

- Characterization
- Decontamination
- Dismantlement (volume reduction)

2.2 Objectives

The objectives of the 321-M LSDDP were to:

- Demonstrate innovative and improved D&D technologies, develop performance comparisons to existing methods and technologies, and illustrate economic and worker-related benefits.
- Test technologies to achieve meaningful cost and performance information for potential end-users.
- Utilize an ongoing D&D project for technology demonstrations, in order to qualify technologies for repetitive, reliable implementation within the DOE Complex and the commercial sector.
- Ensure the 321-M deactivation problems selected to solve are primarily focused on DOE Complex-wide problems.
- Maximize participation of Integrating Contractor Team members to improve technology identification and repetitive transfer within the private sector, while integrating industry and academia expertise to accelerate technology progress.
- Leverage funding on the 321-M LSDDP from various DOE offices, technology vendors, and industry experts to optimize resolution of the complex problems facing federal and private entities in the D&D of nuclear facilities.

2.3 LSDDP Organizational Structure

To accomplish the 321-M LSDDP purpose and objectives, DOE-SR and Westinghouse Savannah River Company selected a management team to manage the execution of the large scale demonstration project. The management team included the Administrating Contractor (WSRC) and D&D industry experts. The technology management team was referred to as the Integrating Contractor Team (ICT) and consisted of representatives from the SRS Facilities Decommissioning Division, a representative from the Savannah River Technology Center, and representatives from Duke Engineering and Services (DE&S), Florida International University (FIU), and NES, Inc. The Army Corps of Engineers (ACOE) was subcontracted by DOE-NETL and assisted in the preparation of the Innovative Technology Summary Report cost analyses. The ICT organization and selected technology vendors are depicted in Figure 1.

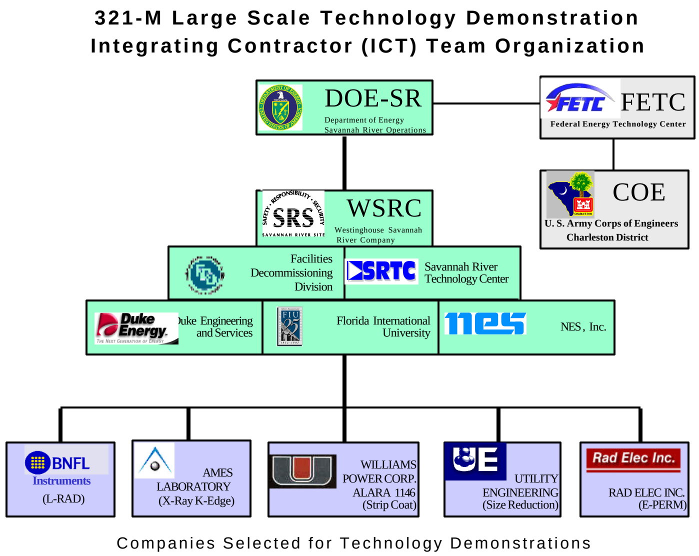

Figure 1.
NOTE: FETC is now the National Energy Technology Laboratory

The 321-M LSDDP was funded by the Office of Science and Technology (EM-50), through the National Energy Technology Laboratory (NETL), under the auspices of the D&D Focus Area (DDFA). The project was identified by Technical Task Plan number SR-08-DD-21.

2.4 Roles and Responsibilities

The roles and responsibilities of the Integrating Contractor Team (ICT) were as follows:

1. The ICT shall ensure the integration and balance of the large scale demonstration of innovative/improved technologies with the needs of the baseline deactivation project. The ICT will ensure innovative/improved technologies integrated into the deactivation project will not cause undue adverse impact to the project baseline.

2. The ICT shall select innovative/improved technologies for incorporation into the Large Scale Demonstration & Deployment Project (LSDDP). Technology selection will be based on potential benefits to the DOE Complex with an emphasis on overall mortgage reduction to surplus facilities.
3. The ICT shall ensure, to the extent practical, each innovative/improved technology selected for incorporation into the LSDDP can be directly compared to an appropriate baseline technology. When advantages can be realized from using existing empirical baseline technology data or calculated baseline technology data, the ICT shall explore this opportunity and agree with the use of the retrieved or calculated data.
4. The ICT shall review the data quality objectives (test objectives) associated with a technology demonstration.
5. The ICT shall identify the correct performance and cost data that must be collected to properly develop an Innovative Technology Summary Report (ITSR) for each demonstrated technology.
6. The ICT shall review each Innovative Technology Summary Report (ITSR) in its entirety. The review shall include, but is not limited to, the technical content section, the cost analysis section, a review of the report's usability, and a review of the report's objectivity.
7. The ICT shall communicate the results of the innovative/improved technology demonstrations throughout the DOE Complex.
8. Each ICT member should facilitate the transfer of successful innovative/improved technologies through their parent company or organization.
9. Each ICT member is encouraged to present LSDDP results at related conferences, seminars, and meetings. Coordinate presentations with the 321-M LSDDP Principal Investigator.
10. The ICT may, over the course of the 321-M Large Scale Demonstration & Deployment Project, assume additional responsibilities as prescribed through agreement between DOE-Savannah River and DOE-National Energy Technology Laboratory.

The key personnel assignments for the 321-M LSDDP and their project responsibilities are listed below:

Project Manager – The project manager was responsible for the project management and project control activities on the 321-M Deactivation Project and the 321-M LSDDP.

Principal Investigator – The principal investigator served as the administrating contractor for the 321-M LSDDP. The principal investigator was tasked with coordinating the efforts of technology vendors and off-site ICT members with the on-site ICT members and other SRS support organizations.

Off-site ICT members – The off-site ICT members included a representative from DE&S, FIU, and NES. They served on the Integrating Contractor Team and assisted in the identification, evaluation, screening, and selection of the five innovative technologies that were demonstrated in the 321-M Facility. (As members of the ICT, they fulfilled all duties as outlined in the ICT roles and responsibilities list.)

Test Engineers – The test engineer was the coordinator for all activities associated with a specific technology demonstration.

Army Corps of Engineers Cost Analyst – The cost analyst assisted in the development of the cost analysis sections of the Innovative Technology Summary Reports.

3.0 321-M BACKGROUND / HISTORY

3.1 Background

The 321-M Fuel Fabrication Facility was built in 1956. It's mission for 40 years was to fabricate fuel and target assemblies for irradiation in the site's production reactors. Although the facility was deinventoried in 1995, holdup quantities of highly enriched uranium (HEU) still remain in the ventilation ducts and some process equipment. For 40 years, fuel machining, cutting, and fabrication operations took place on the west side of the building and resulted in the contamination of this area. Approximately 9000ft^2 of the 60,000ft^2 facility is contaminated with alpha contamination. A portion of the facility overheads is potentially contaminated. The facility roof has outlived its warranty and has started to leak.

3.2 Operating History

The fuel being manufactured in 321-M consisted of tubular uranium and aluminum assemblies. The major manufacturing processes included melting and alloying, casting, machining, extruding, and welding. Additional equipment included annealing ovens, cleaning vats, and inspection and assay equipment.

Since the facility processed highly enriched uranium and other accountable nuclear material, there was elaborate security in effect, with multiple physical barriers, electronic surveillance, and resident armed guards. In addition, the material was tracked and accounted for at every production step inside the building, and there was a high degree of segmentation. Operations were carried out by a staff of about 45, plus security forces.

The interior of the facility was organized into distinct areas, for accountability, for process and material flow control, and for contamination control. Material arrived in a receiving area. The fissile material was assayed and weighed, and then stored in a vault. All spaces where unclad uranium metal and uranium-aluminum alloy were processed were in a contiguous area for contamination control. This included the vault, a charge preparation area where the uranium and aluminum were weighed out, the casting room, the machining room, and a portion of the billet assembly and weld area. These rooms and areas were supported by separate ventilation systems with HEPA filtered exhausts.

Material leaving the contamination area consisted of uranium-aluminum cores. In the Billet Assembly and Weld Area, the cores were assembled into aluminum sheathed components. The final fabrication steps were carried out in the large, high bay finishing area and at the south end of the facility. The final fabrication steps included heatup and annealing, extrusion, trimming, final assembly, and quality inspections. The finished fuel tubes were then stored in a high-integrity, critically safe storage area commonly referred to as the honeycomb. Upon request, these tubes were assembled into fuel bundles and shipped to one of the site's production reactors.

Offices, toilets, change facilities, a lunchroom, a computer room, and maintenance shops were also provided for the staff.

The production reactors were shut down for various reasons during the 1980's. In the early 1990's, a major reactor restart effort at the Savannah River Site was undertaken, but this was discontinued when the cold war ended in 1992. Several of the reactors, and the fuel fabrication facility, were kept in standby for an eventual restart. In 1995, it was decided to permanently shut down the 321-M Fuel Fabrication Facility.

The permanent shutdown was accompanied by a "deinventory campaign". The finished fuel that was in storage and other raw materials were removed from the facility and shipped to designated storage areas on site. This allowed the high security measures at the facility to be discontinued. The electronic surveillance was cannibalized to serve other facilities; the armed guards were removed; the nuclear criticality instrumentation was cannibalized; and the computer system was dismantled. Cleaning and degreasing fluids were drained and flushed from facility tanks and vats. Finally, most 321-M personnel were reassigned. A small custodial force remained to perform surveillance and maintenance on the surplus facility.

4.0 IDENTIFICATION OF FACILITY PROBLEMS AND TECHNOLOGY NEEDS

4.1 Facility Problems

Holdup Material

A significant and accountable quantity of uranium remains in the facility, inside ventilation and equipment enclosures, and gloveboxes and hoods. This material exists in various physical forms, ranging from a surface film, to dust and chips, to cuttings.

Contamination

One seventh of the building, about 9,000 ft^2, has been contaminated by uranium. The levels are high enough to classify this portion of the facility as a High Contamination Area. The contamination is pervasive, and exists on floors, walls, and equipment surfaces. Furthermore, the dust that accumulated in the overheads on light fixtures, ducts, conduit, pipes, and cable trays is presumed to be contaminated.

Asbestos

In the 1950's, material containing asbestos was commonly used in construction. Much of it has been replaced over the years by non-asbestos materials, but there is still some that remains. Specific examples of asbestos include the insulation found on steam piping, insulation on ventilation supply ducts, and asbestos-cement siding panels (i.e., transite panels).

Lead and other Hazardous Materials

Lead shielding was used in various places, mainly to establish low background levels for the sensitive analysis instruments that were used during the manufacturing process.

Many cabinets remain in the facility, inside of which are a variety of chemicals, such as paints, lubricants, adhesives, dye penetrants, cleaners, and the like.

4.2 321-M Facility Technology Needs

At the outset of the 321-M Deactivation Project, the facility problems called for technology solutions in the following D&D technology categories:

- Characterization Technologies: Innovative technologies were sought that would assist in the accurate location and quantification of highly enriched uranium (HEU) held up in the facility's process equipment and ventilation ducts. Emphasis was placed on non-destructive methods to measure holdup in process equipment, inaccessible locations, overhead cable trays, and ventilation ducts.

- Decontamination Technologies: Innovative technologies were sought that could improve the decontamination of process equipment, ductwork, concrete surfaces, and other miscellaneous components (e.g., electrical cables, cable trays, piping, and conduit). The selected technologies should have the potential to reduce costs, reduce occupational exposure, minimize waste, and support the recycle or reuse of materials and equipment.

- Dismantlement/Volume Reduction Technologies: Innovative technologies were sought to dismantle and volume reduce contaminated process equipment, support equipment, ventilation ducts, and overhead items. The selected technologies should lower the health and safety risks to the worker and provide enough volume reduction to significantly lower disposal costs, thereby reducing the impact to the environment.

- Stabilization Technologies: Innovative technologies were sought to provide long term and temporary stabilization of contaminants in the 321-M Facility. Long term stabilization of contamination would allow contamination to be left in place while meeting facility surveillance & maintenance requirements. Temporary stabilization prior to equipment dismantlement or removal would reduce the exposure to personnel and the environment during these operations. The selected technologies should be able to trap uranium contamination on exposed facility surfaces and in process equipment and ventilation ducts.

4.3 SRS D&D Technology Needs

The D&D Technology Need / Opportunity Statements constitute a running list of site deactivation and decommissioning needs. Several of these formalized technology needs can be aligned with the technology needs on the 321-M Deactivation Project.

The need for specific characterization technologies to support the 321-M deactivation is best represented by Technology Need SR-4005, Characterization of Inaccessible Areas.

The need for specific decontamination technologies to support the 321-M deactivation is best represented by Technology Need SR-4004, Decontamination of Contaminated Concrete.

The need for specific dismantlement technologies to support the 321-M deactivation is best represented by Technology Need SR-4001, Dismantlement of Large and/or Complex Equipment and Structures.

The need for specific stabilization technologies to support the 321-M deactivation is best represented by Technology Need SR-4012, Stabilization of Contaminated Equipment / Components / Surfaces.

5.0 TECHNOLOGY SELECTION

5.1 Process

The first phase of the LSDDP involved identifying, assessing, and then selecting the best innovative technologies for demonstration in the 321-M Fuel Fabrication Facility. The process that was followed by the ICT is outlined below:

List Potential Innovative/Improved Technologies

- Brainstorm potential technologies
- Check databases and select potential technologies for further consideration
- Individual research yields potential technologies
- Expression of Interest yields potential technologies
- Commerce Business Daily listing yields potential technologies

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Assign ICT Members to Research Technologies

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Contact Vendors (as needed)

- This contact may result in a preliminary proposal from the interested vendor.

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ICT Member Prepares Presentation to Describe Technology to the Integrating Contractor Team

- Technology Screening Form filled out and presented to the integrating contractor team.

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Vendor Presentation (as needed)

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ICT Endorses Technology

- At this point, the technology screening, assessment, and selection process has been completed.

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Vendor(s) for Selected Technology Respond to RFP with a Detailed Proposal

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ICT Evaluates the Detailed Proposal(s) and Selects the Best Proposal

5.2 Technologies Screened

For the most part, the technology identification and screening activities lasted from April 1998 to August 1998. (Note: Several technologies were investigated in the Fall and Winter of 1998 {e.g., size reduction}.) In total, 90 new and improved technologies were evaluated in five D&D-related categories: Characterization, Decontamination, Stabilization, Dismantlement/Removal, and Health & Safety.

Technologies were assessed against ten criteria. The criteria and scoring system was captured on a Technology Screening Form developed by the ICT. A blank Technology Screening Form is provided in Appendix A for reference.

A documented record of this review was provided to Florida International University. The documented technology screening data was input to the FIU Technology Information System (TIS) database. These data can be retrieved by getting password access, from FIU, to the Technology Information System database.

5.3 Technologies Selected

As a result of the screening process, five technologies were ultimately selected and pursued for demonstration in the 321-M Fuel Fabrication Facility. These new and improved technologies were compared against baseline technologies. The innovative technologies and the corresponding baseline technologies are listed below:

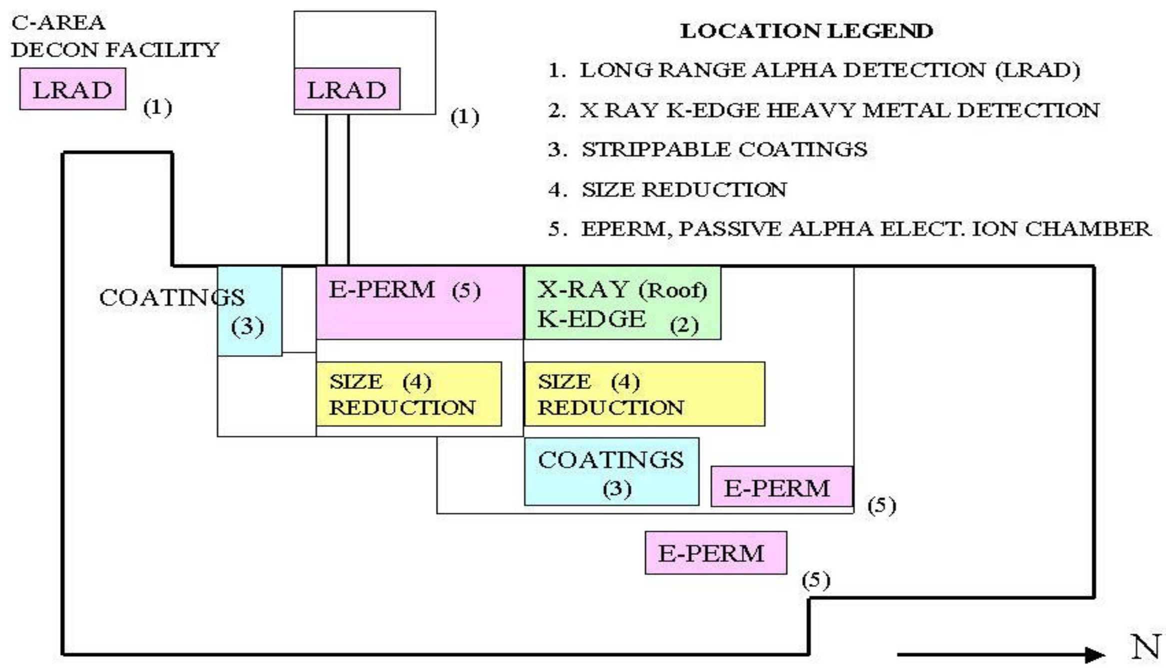
INNOVATIVE TECHNOLOGY	BASELINE TECHNOLOGY
* Long Range Alpha Detection (LRAD)	* Manual probe & smear method
* Portable X-Ray, K-Edge Heavy Metal Detector	* NaI Detection System

* ALARA 1146 Strippable Coating
* E-PERM Alpha Surface Monitor
* Size Reduction Machine
* Steam Vacuum Cleaning System
* Manual probe & smear method
* Portable band saw and Hand-held shear

6.0 TECHNOLOGY DEMONSTRATIONS

6.1 Demonstration Locations

Five technologies were demonstrated in the 321-M Fuel Fabrication Facility. The location of these demonstrations is depicted in the figure below.



6.2 Technology Descriptions

A description of the five innovative technologies and their baselines is captured in the Technology Post-Demonstration Fact Sheets. The results of each demonstration and the benefits of the innovative technologies are also covered in the post-demonstration fact sheets. Reference Appendix B for copies of the post-demonstration fact sheets.

6.3 *Technology Schedule*

Technology	Dates Demonstrated
Long Range Alpha Detection (LRAD)	
- Decon Facility	- 11/1/98 to 11/5/98
- 321-M Facility	- 11/8/98 to 11/12/98 and 1/11/99 to 1/15/99
X-Ray, K-Edge Heavy Metal Detection	- 2/16/99 to 2/26/99
ALARA 1146 Strippable Coating	- 11/2/98 to 11/17/98 and 5/11/99 to 5/18/99
E-PERM Alpha Surface Monitor	- 6/16/99 thru 8/24/99
Size Reduction Machine	- 8/17/99 thru 9/2/99

6.4 *Needs Addressed by Innovative Technologies*

Savannah River Site technology need statements have been in existence for several years. The innovative technologies demonstrated in the 321-M LSDDP address several of these need statements. The correlation between demonstrated technology and technology need is provided below.

INNOVATIVE TECHNOLOGY	TECHNOLOGY NEED ADDRESSED
LRAD	SR-4005
X-Ray, K-Edge	SR-4005
ALARA 1146 Strippable Coating	SR-4004 and SR-4012
E-PERM	SR-4005
Size Reduction Machine	SR-4001

6.5 *Future Technology Deployments at SRS*

The ALARA 1146 Strippable Coating will be used in FY00 to rollback contamination areas in surplus facilities owned by the Facilities Decommissioning Division (FDD). After the initial demonstration of the strippable coating, FDD redeployed it three additional times in FY99. More deployments are expected in FY00.

The Size Reduction Machine will be used on several deactivation jobs in FY00. The FDD Decon Facility has incorporated the SRM into its decommissioning toolbox.

7.0 COMMUNICATIONS

7.1 Communication Plan

The 321-M LSDDP Communication Plan outlined the strategy for sustaining effective internal and external communications on the large scale demonstration project. The Communication Plan is included as Appendix C to this report.

7.2 Technology Transfer Activities

One of the objectives of the project was to communicate D&D technology successes throughout the DOE complex and the commercial sector. The knowledge of these new technologies and their performance and cost advantages must be shared. The following avenues were employed to get the word out:

- **Innovative Technology Summary Reports (ITSRs)**
  - Long Range Alpha Detection for Component Monitoring (OST Reference # 2382)
  - Portable X-Ray, K-Edge Heavy Metal Detector (OST Reference # 134)
  - ALARA 1146 Strippable Coating (OST Reference # 2314)
  - E-PERM Alpha Surface Monitor (OST Reference # 2315)
  - Size Reduction Machine (OST Reference # 2395)

- **Pre- and Post-Demonstration Fact Sheets**
  - Long Range Alpha Detection (LRAD) for Component Monitoring
  - X-Ray, K-Edge Heavy Metal Detection
  - Strippable Coatings for Decontamination
  - Alpha Electret Detection (E-PERM) for Contamination Monitoring
  - Size Reduction Machine

- **SRS Large Scale Technology Demonstration Web Site**
  (url – http://www.srs.gov/ then "technology", then LSDDP)

- **Conferences, Seminars, Technology Exchange Meetings**
  - DDFA 1998 Mid-Year Review Meeting, Morgantown, West Virginia
  - Environmental Advisory Committee Meeting, Aiken, South Carolina
  - Spectrum '98, Denver, Colorado
  - Ames Laboratory Meeting, Iowa State University, Ames, Iowa
  - Waste Management '99, Tucson, Arizona
  - Joint D&D / Deactivation National Committee Meeting, Oakland, California
  - Tenth Annual Applied RD&D Cleanup Technology Colloquium, Phoenix, Arizona
  - DDFA 1999 Mid-Year Review Meeting, Morgantown, West Virginia
  - Decommissioning, Decontamination & Reutilization of Commercial and Government Facilities Second Topical Meeting, Knoxville, Tennessee
  - Technology Information Exchange (TIE) Workshop, Las Vegas, Nevada
  - Southeast Environmental Management Association (SEMA) Conference, Martinez, Georgia

*Project progress presentations, exhibit booths, technical paper presentations, and panel discussions were activities the project team participated in while at these conferences, seminars, and meetings.

- **LSDDP Articles**
  - DDFA Quarterly Report, 2nd Quarter of FY98
  - DDFA NETL Update, May '98
  - DDFA NETL Update June '98
  - Nuclear Plant Journal article, May-June '98
  - DDFA Quarterly Report, 3rd Quarter of FY98
  - Initiatives in Environmental Technology Investment (WPI publication) article, Summer of '98
  - Nuclear News article, July '98
  - DDFA NETL Update, August '98
  - FDD Good News bulletin, September '98
  - Environmental Management Research and Development Program Plan, Fall '98
  - DDFA Annual Report for FY98
  - Demolition and Environmental Contractor (DEC) magazine article, November-December '98
  - Decommissioning & Decontamination Monitor article, March '99
  - Initiatives in Environmental Technology Investment (WPI publication) article, Spring '99
  - SRS News article, April '99
  - Nuclear Engineering International article (projected), Winter '99
  - Technology Solutions article (SRS technical newsletter), Winter '99

- **D&D Industry Experts on the Integrating Contractor Team**
  - Duke Engineering & Services representative
  - Florida International University (FIU) representative
  - NES, Inc.

- **Other**
  - Technology Display Board, in support of the "Joint Meeting Between the National Field - Headquarters Liaison Committees for Deactivation & Decommissioning", November '98
  - Technology Display Board, SRS main building lobby, December '98
  - Technology Display Board, SRS Technology Day for National Engineer's Week, February '99
  - LSDDP Media Day (TV, local newspapers, tour, formal presentations), February '99
  - Technology Display Board, SRS cafeteria, in support of SRS-P2 Week, September '99
  - Material provided to support the Argonne D&D Training Course, November '99
  - Inputted all information on Strippable Coatings and the Size Reduction Machine to the FIU Technology Information System (TIS) database.

The project team did an exemplary job of transferring innovative technology know-how to the DOE Complex. The many conferences and articles that covered the project's progress and findings ensured the technology message reached a commercial audience as well as the government.

8.0 SUMMARY PERFORMANCE AND COST RESULTS
(FOR INNOVATIVE TECHNOLOGIES)

8.1 Long Range Alpha Detection System

- The Long Range Alpha Detection System, commercially known as the IonSens monitor, provides cost savings over the baseline probe & smear method when monitoring large or complex items and when monitoring multiple items during a single measurement cycle.
- Monitoring multiple items at one time makes LRAD 2.3 times faster than a conventional round of probe & smear measurements on the same number of items.

- The cost for monitoring a single item with the LRAD monitor was $8.49 versus $3.30 for the baseline. For multiple items, the cost drops to $1.70 per item if five items or more are monitored in a single measurement cycle.
- Items with surfaces that are inaccessible to a probe & smear survey, normally become radioactive waste. One measurement cycle, costing approximately $8.49, can save several cubic feet of burial cost at $106/ft^3 if the internals of the item can be determined to be clean.

8.2 Portable X-Ray, K-Edge Heavy Metal Detector

- The X-Ray, K-Edge System is about an order of magnitude more precise than the NaI Detection System.
- Based on the SRS field demonstration, the X-Ray, K-Edge System assayed ventilation duct at a rate of 2.55 linear feet per hour, approximately 11% faster than the NaI baseline method.
- On a unit cost basis, the X-Ray, K-Edge System is less expensive than the baseline technology. The calculated savings is $7.09 per linear foot. The high mobilization/demobilization costs of the X-Ray, K-Edge System make its use cost prohibitive for smaller assay jobs. For assay jobs over 6000 feet of ventilation duct, X-Ray, K-Edge unit cost savings will overcome the fixed costs of the technology and make this technique the method of choice.

8.3 ALARA 1146 Strippable Coating

- The decon rate for the ALARA 1146 strippable coating was 133.1 ft^2/man-hr. This was comparable to the steam vacuum cleaning technology.
- Decontamination factors for the ALARA 1146 strippable coating and the steam vacuum cleaning technology were comparable.
- The ALARA 1146 strippable coating unit cost is $4.83/ft^2. The unit cost for the steam vacuum cleaning technology is $2.74/ft^2. However, the mobilization/demobilization costs for strippable coating are much less than for steam vacuum cleaning. The empirical data yields a situation where the improved technology (ALARA 1146) is the technology of choice for smaller area decontamination jobs where very low mobilization/demobilization costs make up for the higher unit costs. At 3500 ft^2, the baseline technology becomes the preferred technology.

8.4 E-PERM Alpha Surface Monitor

- E-PERM electret ionization chambers yielded survey results equivalent to the baseline probe & smear method.
- The E-PERM technology and the probe & smear technique can measure an equal number of spots per hour (~16 readings per hour).
- The E-PERM technology minimizes personnel exposure and meets the intent of ALARA.

8.5 Size Reduction Machine

- Use of the SRM had several safety benefits over the baseline technologies: (1) tethered control panel allowed the operator to control the machine from a comfortable distance (2) long reach and six degrees of freedom eliminated the need for scaffolding (3) use of SRM means heavy cutting equipment does not need to be physically manipulated, thereby reducing the number and severity of careless mishaps or injuries brought on by operator fatigue.
- The SRM cut thin-walled components, heavy structural shapes, and overhead fixed items in less time than the baseline technologies.
- The SRM cut thin-walled components at a unit cost of $2.33/cut. On average, this was 46% less costly than the PBS and the HHS.
- The SRM cut overhead fixed items at a unit cost of $6.50/cut. On average, this was 28% less costly than the PBS and the HHS.
- On a unit cost basis, the SRM was comparable to the PBS and the HHS when cutting heavy structural shapes.

9.0 PROJECT SUMMARY

9.1 Dialogue

<u>Technical</u>

A plan is being developed to decommission the 321-M Facility. The plan entails the removal of the highly enriched uranium. Technologies demonstrated as part of the LSDDP will be evaluated against the 321-M Decommissioning needs and utilized where appropriate.

<u>Cost</u>

The 321-M Deactivation Project was funded by EM-60 and needed to be equal to or greater than the funding provided by EM-50 for the LSDDP. To date, the 321-M Deactivation Project has spent $1.5M and plans to spend an additional $2.0M in FY00 to remove the Highly Enriched Uranium holdup material in ductwork, machines, hoods and piping.

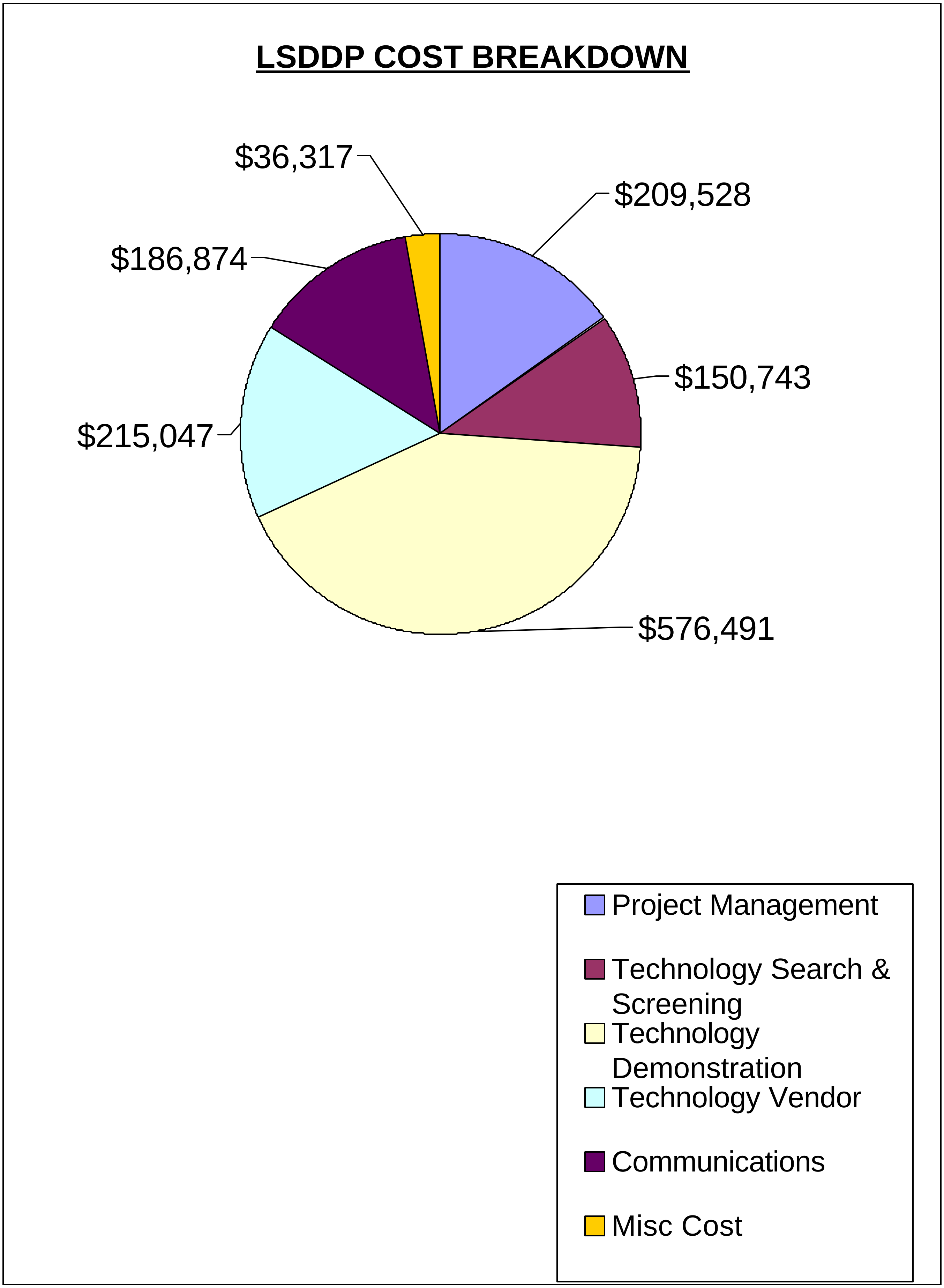
OST (EM-50) funding for the LSDDP has totaled $1.375M over three fiscal years as follows:

FY98 - $360K: Initial authorization plus $46K of additional funding transferred from the CORPEX technology demonstration.
FY99 - $785K: Continuation of original authorization plus $69K of additional funding transferred from the Stainless Steel Beneficial Reuse Program
FY00 - $60K: Final authorization plus $55K additional funding transferred from another FDD technology demonstration.
Note: The originally funded amount was $1.205M.

TOTAL - $1.375M of EM-50 funding

9.2 Pie Chart Breakdown

See Pie Chart on next page.


LSDDP COST BREAKDOWN
$36,317
$209,528
$186,874
$150,743
$215,047
$576,491
Project Management
Technology Search & Screening
Technology Demonstration
Technology Vendor
Communications
Misc Cost

To further explain what is included in each section of the pie chart, the following is provided;

Project Management - Includes Project Manager's time (EW217SUPM), Project Controls (EW217SUPC), Estimating (EW217ESTI) and 50% of the Principal Investigators time that was spent on project management activities (EW217AFDD).

Technology Search & Screening - Includes all the ICT costs (EW217ICTB, EW217ICTD, EW217ICTF, EW217ICTN) and several technologies that never made it to the demonstration phase (EW217LIBS, EW217BOXC, EW217ASBS, EW217GLAS,EW217ICEV).

Technology Demonstration - Includes all costs associated with each technology demonstration, excluding the vendor costs (EW217LRAD, EW217KEDG, EW217STRP, EW217EPRM, EW217SRED, EW217ITRS, EW217KELY).

Technology Vendor - Includes all costs paid to the vendors (Purchase orders: AC10930, AC15331, AC02466, AB85803 (20% of PO value), AB96164, KD53177, KD83882, and KD86532).

Communications - Includes cost for ICT conference calls and meetings, project meetings, media day, presentations at conferences, midyear reviews, final close-out report (50% of EW217AFDD, EW217WEBB, EW217KNOX, EW217FRPT).

Miscellaneous Costs - Includes travel and support costs from the Savannah River Technology Center (EW217TRAV, EW217SRTC).

10.0 RECOMMENDATIONS AND LESSONS LEARNED

During the course of the 321-M LSDDP, unanticipated problems, innovative ideas, and improvements were discovered. WSRC compiled these recommendations, and present them in this Final Report, in hopes that future LSDDPs may gain from the SRS experience. The Lessons Learned include:

- Integration of the deactivation project (or decommissioning project) with the LSDDP is a much more difficult task than imagined. To gain the most benefit from the deployment of an innovative technology, each of the selected technologies must be rigorously screened for its compatibility with the mother project. A weak match must be quickly dropped from further consideration.
- Project costs can dwarf vendor costs and are oftentimes the root cause of an excessive cost variance on an individual technology demonstration.
- Reliance on a calculated or estimated baseline does not provide the most reliable benchmark. From a performance and cost comparison standpoint, demonstrating the innovative technology alongside the baseline technology makes for a better comparison.

- By design, the cost section of each ITSR report (Section 5 and the associated appendices) was prepared by the U.S. Army Corps of Engineers (ACOE) and paid for by DOE-NETL. This arrangement was mandated by DOE-NETL to standardize the cost analysis section of all ITSRs. The following are some suggestions on how to improve the cost section:
  1) Let the contractor pay the ACOE for their scope of work. This places the responsibility with the contractor who is responsible for everything else.
  2) There should only be "ONE," *core* group within the ACOE that performs the cost analysis for the ITSRs. Just because an office is located close to a demonstration site does not mean it would be more cost effective to have that office do the work. On the contrary, the 321-M experience was that new cost engineers had a steep learning curve, which impacted the quality of initial products. In addition, assigning the ITSRs to a core group would allow seemingly allow the analyses to maintain an appropriate priority level.
  3) The ACOE cost engineers need to be much more involved with each technology demonstration, beginning with development of the test plan to field testing to data collection. A minimum of 200 hours for a small demonstration to 400 or more hours on a large demonstration may be required. Resources should be made for this kind of support.

- Members of the 321-M LSDDP project team should be assigned to serve on the ICT of future LSDDPs to transfer their experiences to the new projects.

11.0 REFERENCES

Innovative Technology Summary Reports

Long Range Alpha Detection for Component Monitoring (OST Reference # 2382)

Portable X-Ray, K-Edge Heavy Metal Detector (OST Reference # 134)

ALARA 1146 Strippable Coating (OST Reference # 2314)

E-PERM Alpha Surface Monitor (OST Reference # 2315)

Size Reduction Machine (OST Reference # 2395)

APPENDICES

Appendix A Technology Screening Form

Appendix B Technology Post-Demonstration Fact Sheets

Appendix C Communication Plan

APPENDIX A

TECHNOLOGY SCREENING FORMS

Generic Technology Name (or Technology Area):

Vendor-Specific Technology Name:
File Number: __________ [assigned by 321-M LSDDP Principal Investigator]

Technology Provider (i.e., vendor):

Technology Description:
(... include discussion of typical application and application planned for 321-M + discuss the innovative or improved aspects of the technology)

Technology Category:
(... put check in the appropriate technology category)

C	=	Characterization	( )	DR	=	Dismantlement / Removal	( )
D	=	Decontamination	( )				
S	=	Stabilization	( )	O	=	Other	( )

____

Baseline Technology in the 321-M Facility against which this technology will be evaluated:

Facility Problem the Innovative/Improved Technology could solve:

Technology Evaluation Results:
(... put check next to technology evaluation result)

Technology Accepted ( )
Technology Not Accepted ( )

Reason why technology was not accepted:

I. Go - No Go Section:
(... circle the correct response)

Technology meets Innovative / Improved Technology Definition. Y N

*** Response must be a "Y" for yes to go on. ***

Technology offers the potential for performance improvement over the baseline. Y N

Technology offers the potential for a cost reduction as compared to the baseline. Y N

Technology use can reduce risks to the public, the workers, and / or the environment. Y N

*** There must be at least one yes response to go on. ***

II. Selection Criteria Section:

◆ The following criteria must be satisfied [with 3's or above] before this technology could be considered a serious candidate for full scale demonstration (... circle the appropriate ranking for each criteria):

State of Maturity Rank: 1 2 3 4 5

The technology must be "field test ready" for a large-scale demonstration. The LSDDP should serve as one of the few remaining steps in commercializing the technology and achieving broad acceptance across the DOE complex and the commercial sector. Technologies requiring substantial additional research and development were not considered as candidates for demonstration.

Numerical Evaluation:	1 =	Not ready for demonstration
	5 =	Used commercially for identical or similar purposes

DISCUSSION:

Transportability to 321-M Rank 1 2 3 4 5

The technology must be capable of being transported to the 321-M Fuel Fabrication Facility.

Numerical Evaluation:	1 =	Difficult or impossible to transport technology
	5 =	Minimal effort to transport to 321-M

DISCUSSION:

Provides a Solution to a 321-M Project Need Rank 1 2 3 4 5

The technology must be able to address a need for the remaining scheduled deactivation activities at 321-M.

Numerical Evaluation:	1 =	Technology does not address a 321-M Facility need

	5 = Technology meets one or more 321-M Facility needs

DISCUSSION

Ability of Technology to be Evaluated Against Quantifiable Performance Measures Rank 1 2 3 4 5

It must be possible to develop quantitative performance measures by which the technology can be evaluated during a demonstration.

Numerical Evaluation:	1 = Difficult to establish measures that define success of the demonstration 5 = Demonstration has clearly defined performance indicators that measure cost, dose, and waste parameters

DISCUSSION:

◆ The following criteria are of high importance to ensure this technology demonstration provides maximum benefit to the LSDDP (... circle the appropriate ranking for each criteria):

Application Across Complex Rank 1 2 3 4 5

This technology should be capable of being applied across the DOE Complex and should be able to resolve multiple problems.

Numerical Evaluation:	1 = Only applicable at one DOE site or facility and not useful at others 5 = Applicable at any DOE site or facility

DISCUSSION:

Improvement Over 321-M Baseline Rank 1 2 3 4 5

This technology should be able to improve upon the current industry technologies and processes, which constitute the 321-M baseline. Successful demonstration of this technology should provide the opportunity for overall cost savings or cost avoidance relative to the 321-M baseline.

Numerical Evaluation:	1 = Cannot make significant improvement in the progress of the deactivation at 321-M

	5 = Improvement easily measured (i.e., in terms of radiation dose, generation of waste, schedule reductions, cost savings, cost avoidance, etc.)

DISCUSSION:

Cost/Benefit (Complex-Wide) Rank 1 2 3 4 5

This technology should have applicability across a wide range of DOE facilities and commercial plants with an associated overall cost savings (or cost avoidance) to each of these facilities.

Numerical Evaluation:	1 = Cost to deploy does not realize a tangible benefit across the DOE Complex. 5 = Cost to deploy realizes significant benefits across the DOE Complex (e.g., industrial safety benefits, production rate increases, radiation dose reductions, schedule acceleration, waste volume reductions, etc.)

DISCUSSION:

◆ The following criteria are important to ensure this technology demonstration provides maximum benefit to the LSDDP (... circle the appropriate ranking for each criteria):

Cost of the 321-M Demonstration Rank 1 2 3 4 5

The overall demonstration cost should be considered. The willingness of technology providers to cost-share and the percentage of that cost share would be key factors in the technology selection.

Numerical Evaluation:	1 = All costs are passed to the LSDDP, none are absorbed by the vendor 5 = No cost to the LSDDP for any aspect of the demonstration

DISCUSSION:

Compatibility with the 321-M Deactivation Baseline Schedule Rank 1 2 3 4 5

This technology demonstration should be able to fit within the remaining scheduled D&D activities.

Numerical Evaluation:	1 = 321-M schedule has to be substantially adjusted to accommodate the demonstration

	5 = Demonstration provides an activity that fits the 321-M schedule and supports a vital baseline activity previously identified in the 321-M baseline

DISCUSSION:

Technology Provider's Interest in Participating Rank 1 2 3 4 5

The technology provider should demonstrate enthusiasm, support, and willingness to demonstrate at 321-M. In addition, the provider should demonstrate a willingness and ability to commercialize the technology following a successful demonstration.

Numerical Evaluation:	1 = LSDDP must perform a large coordination role in the demonstration, and provider displays minimal willingness to work with LSDDP / 321-M personnel 5 = Provider performs all tasks and supplies all essential consumables for the demonstration and displays a strong make-it-happen attitude

DISCUSSION:

III. <u>Summary Comments Section</u>:

IV. <u>Contacts Section</u>:

	Name	Company	Telephone	Fax	e:Mail	Address
1						
2						
3						
4						

V. <u>Specific Technology Information Section</u>:

(list of attachments)

APPENDIX B

Technology Fast Sheets
(POST-Demonstration)

SAVANNAH RIVER SITE

321-M Fuel Fabrication Facility

Technology Post Demonstration Fact Sheet
November 30, 1999

ALPHA ELECTRET DETECTION (EPERM) FOR CONTAMINATION MONITORING

The Need

The 321-M Fuel Fabrication Facility was used to manufacture fuel elements for reactors. This involved precise weigh-out of aluminum and enriched uranium, melting them together into alloy, extruding the alloy into tubes, and various steps involving machining, welding, and chemical cleaning. These activities contaminated many areas and components with uranium.

There is an operational need to determine surface uranium contamination levels, to properly categorize radiological Contamination Areas (CAs) and to be able to roll back those areas after decontamination. In order to declare an area free of contamination, SRS requires that a detailed survey be conducted to "prove" the absence of contamination or to determine that the contamination is below free release limits.

Figure 1. SPER2 Microprocessor

The Technology

The innovative technology chosen for this demonstration uses electret ionization chambers (EIC), which consist of a charged Teflon plate (the electret) and an electrically-conductive plastic chamber. The electret is charged using a special process that gives it the property of retaining the electric charge for extended periods of time. The electrets are initially charged by the manufacturer with a 700 volt positive charge. Electret ionization chambers are marketed by RadElec, Inc., under the brand name E-perm™.

Prior to use for measuring contamination levels, the electrets are placed in the surface voltage reader to obtain the initial voltage. The electret is then placed in the chamber and positioned in contact with the contaminated surface to be measured. Alpha particles that enter the chamber ionize the air in it, and the negatively charged ions are attracted to and deposited on the electret, thus reducing the electret's surface charge. The drop in the electret's voltage is a measure of the ionization during the measurement period. Appropriate calibration factors are used to convert the rate of change in the surface charge to activity.

Vendor Contact Information	**RadElec, Inc.** Paul Kotrappa 5714-C Industry Lane Frederick, MD 21704 (301) 694-0011 Pkotrappa@aol.com

The Demonstration

Prior to the final closure of the 321-M Fuel Fabrication Facility, final radiological surveys of the facility are needed to record the status of the facility. The Component Cleaning Room, Tube Cleaning Room, and two overhead areas in the clean area of the building were selected as the location for the EIC demonstration. Both sizes of ion chambers, 48 cm^2 and 180 cm^2, were used in the measurements. In some locations, measurements were made with both large and small chambers and the results compared. In other locations, EIC's were placed at spots where probes and smears were performed for direct comparison.

To determine the accuracy of the EIC's, radioactive sources of known values were monitored.

Demonstration Summary

Tasks involved in the use of the EIC's include: 1) Performing initial electret readings; 2) Placing and removing EIC; 3) Recording initial and final times; 4) Performing final electret readings; and 5) Calculating voltage change and radiation levels.

Electret readings take about one minute per reading using the SPER2 microprocessor. After the initial reading, the final readings become the initial readings for the next measurement. Placing and removing the EIC's are quick and easy, especially in the final surveys of areas ready for free release or rollback. During the demonstration, data was manually entered in spreadsheets and radiation levels calculated. Reporting is made easier with the SPER2 microprocessor's capability to download data to a personal computer.

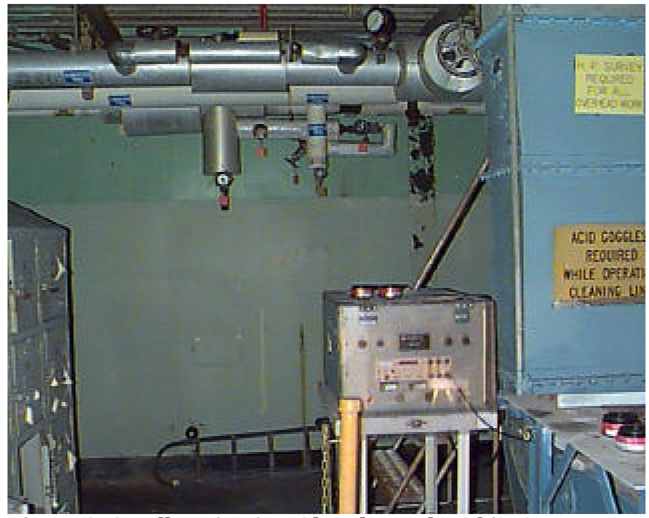


Figure 3. Small Ionization Chambers Placed in Component Cleaning Room

The EICs were able to reliably measure contamination levels below 100 dpm/100 cm^2 alpha with exposure times used in the demonstration. Exposure times ranged from six hours to 96 hours. In general, the small ionization chambers had the advantages of a lower background and less sensitivity for higher contamination levels. The large ionization chambers had shorter exposure times and were more sensitive to low contamination levels. Results of the EIC technology were in agreement with the hand probe and smear technology.

Figure 2. 48 sq cm and 180 sq cm Ionization Chambers

Initial evaluation indicates that the EICs may be slightly more expensive than the baseline; however, EIC technology offers more flexibility and reduced exposure to personnel. The SPER2 reader reduces time involved in report preparation. In hard-to-access areas such as overheads, measurements with the EIC's should be quicker and easier than the baseline.

Benefits of the EPERM Ionization Chambers

- Reduced exposure to personnel
- More cost efficient in hard-to-reach areas
- Eliminates operator error and fatigue

Future Applicability

The EPERM Ionization Chamber technology will become an alternative to the baseline technology at SRS. The technology may be used at SRS when technology capabilities can meet job requirements and objectives.

For more information on E-Perm Ô, visit the RadElec website at http://www.radelec.com/
For more information on the LSDDP, visit the SRS website at http://www.srs.gov/general/srtech/lstd/index.htm

Contact Information

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SAVANNAH RIVER SITE

321-M Fuel Fabrication Facility

Technology Post-Demonstration Fact Sheet
March 30, 1999

X-RAY K-EDGE HEAVY METAL DETECTION

Need Description

For thirty-five years, the 321-M Facility fabricated fuel assemblies for the SRS production reactors. The manufacturing process, combined with high ventilation flow rates, left dust, cuttings, and other forms of highly enriched uranium (HEU) in the building ventilation ducts and the process equipment enclosures. This material is not easily detected with conventional survey instruments because it emits only alpha particles and low energy gammas. The conventional method of measurement used a NaI portable detector which has a resolution of +100%, -50%. A more precise assay measurement was sought.

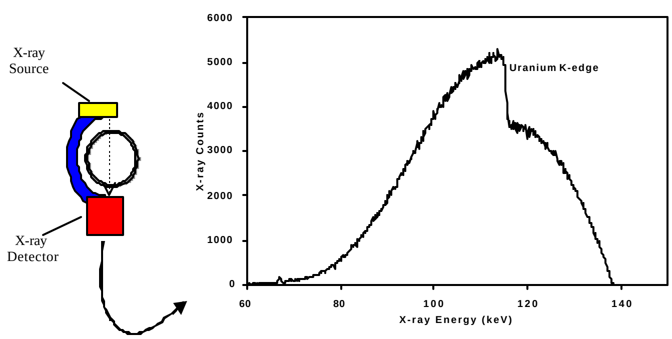

Figure 1. K-Edge Drop for Actual X-Ray Shot

Innovative Technology Description

The X-Ray, K-Edge Heavy Metal Detection System was designed and built by Ames Laboratory and the Center for Nondestructive Evaluation at Iowa State University.

The X-Ray, K-Edge System uses the characteristic absorption of x-rays in heavy metals. An x-ray beam is passed through unknown material. At an element-specific energy, corresponding to the binding energy of the K-shell electrons for that material, x-ray transmission is significantly reduced. An energy sensitive high purity germanium detector (HPGe) is used to analyze the transmitted beam. The energy at which the absorption occurs (known as the K-edge) determines the material; it is unique for each element. The magnitude of the intensity drop can be used to determine the amount of the material.

The measurement system contains three major subsystems: an x-ray generator, a detection subsystem, and a data acquisition subsystem. The x-ray tube and detection subsystem are mounted on a support frame that can be adjusted to accommodate the configuration of the inspected object. The support frame and its attached components is called the inspection head. The data acquisition subsystem contains a personal computer that controls the equipment and analyzes and displays the results.

There are two modes of detection: a wide angle, real-time x-ray imaging mode to ascertain physical distribution of holdup material and a narrow beam spectroscopic mode to quantify a given element.

Baseline Technology

The baseline technology for assaying ventilation ducts and process equipment enclosures is a collimated 2x2-inch NaI hand-held detector. This is a passive gamma measurement system with an advertised precision of +100%, -50%. This system provides a field of view of 45^0 about the axis of the detector.

Demonstration Description

The X-Ray, K-Edge System was used to measure the amount of HEU in the rooftop ventilation exhaust ducts for the Machining Room lathes. The technology will be compared with the NaI passive gamma technology on the basis of cost, speed, precision, ease of deployment, and quality of data.

After the initial setup and validation of the x-ray operation exclusion zone, wide-angle scans were performed to determine the relative distribution of the material and to establish the number and location of subsequent measurements. Narrow-beam measurements were then made to quantify the material and confirm the elemental makeup of the material.

Figure 2. Inspection Head on Ventilation Duct

Demonstration Summary

The Lathe Enclosures rooftop exhaust ducting, up to the HEPA filters, was assayed by the X-ray, K-Edge System. Sixty-six wide-angle images and sixty-six narrow beam spectroscopic shots were made during the 26.5 hours of x-ray operation time. Time expended to reposition the inspection head, perform calibration checks, perform safety interlock checks, perform alignment checks between the imaging unit and the HPGe detector, move the inspection head and vertical stand from one scaffolding platform to another, and find and resolve a few minor electrical problems was included in this total. Approximately 84 feet of ventilation duct was assayed.

The typical measurement cycle for this demonstration entailed two to eight images and spectroscopic shots per linear foot of ventilation duct. Each image looked at a 4" by 4" square. Since seams, bends, and duct diameter reductions yielded the highest HEU measurements, it was in these areas where the most images were taken. It took the X-ray, K-edge operators one to three minutes to acquire an image. A narrow beam measurement was then made to quantify any uranium present at that location.

In cases where there was no obvious indication of uranium, it could take up to ten minutes to achieve a 99% confidence level upper limit. When the images clearly showed the presence of uranium, three to six interrogative shots were made to verify the element and quantify the deposit. The larger the gram content of the deposit, the shorter the time necessary to get a precise reading. Larger deposits only required a one to two minute count time. When gram quantities of uranium were found, the precision was in the + or – 3% range. About one quarter of the 66 narrow beam measurements identified a significant amount of HEU. The other narrow beam measurements placed well-defined upper limits on the amount of uranium present in those areas.

Preliminary data evaluation indicates the X-ray, K-edge System is more precise than the baseline method and provides a quantifiable profile of uranium within the ventilation duct. The inability of the NaI detector to pinpoint the exact location of uranium within a container (like a ventilation duct) proved to be the baseline technology's most significant deficiency. Comprehensive performance and cost analyses are underway and will be reported via a DOE Office of Science and Technology Innovative Technology Summary Report (ITSR).

Planned improvements of the X-ray, K-edge System include using smaller detectors to make the inspection head more portable.

Benefits of the X-Ray, K-Edge Heavy Metal Detection System

- Provides a precise assay measurement
- Provides a quantifiable profile of the heavy metal holdup within a container
- Provides a real-time record of each image and narrow beam spectroscopic measurement
- Provides a non-destructive evaluation of containers with different geometries and with varying wall thicknesses

Future Applicability

The X-ray, K-edge System is best suited for environments where the container material or geometry is not well known or where the holdup material has an irregular distribution. When a holdup material profile is necessary to make work scope decisions, the X-ray, K-edge System is the technology of choice. Improvements to the X-ray, K-edge System will make it more portable and thereby reduce setup time between the x-ray shots.

Contact Persons

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SAVANNAH RIVER SITE

321-M Fuel Fabrication Facility

Technology Post-Demonstration Fact Sheet
March 30, 1999

LONG RANGE ALPHA DETECTION (LRAD) FOR COMPONENT MONITORING

Need Description

Components that have been removed from a contamination area need to be cleared as uncontaminated for reuse or disposal when possible. The conventional method for detecting alpha contamination is the use of hand-held alpha probes and smear samples to scan the surface area. Areas that are not accessible for probing or smearing, such as the internal surfaces of small diameter pipe, may preclude free release or clean disposal of items.

Figure 1. BNFL IonSensÔ Unit with Pipe Measurement Chamber.

Innovative Technology Description

The BNFL Instruments IonSens™ Monitor measures alpha contamination on surfaces by detecting the ionized air molecules produced by the alpha particles when they interact with ambient air.

The device includes three modular units; an input filter unit, a component chamber, and a detector unit. The component chamber can be either a Large Item Monitor (with internal volume about a 1 meter cube), or Cut Pipe Monitor (about 2 meters long). Three Cut Pipe Modules can be used, giving the ability to monitor pipes and scaffold tubes up to 6 meters in length.

Air is drawn through the assembly, picking up the induced ions and delivering them to the detector unit which counts the ions and converts to a corresponding contamination level. A built-in calibration source and an onboard computer make operation simple and straightforward. The software creates a database that includes item identification, total activity, total activity standard error, time, and date.

Baseline Technology

The baseline technology for the free release of materials is a manual probe and smear survey. The surfaces of each item intended for free release must be 100% probed for contamination. Ten percent of the surface area must be smeared for transferable contamination.

Demonstration Description

The IonSens™ system was used to monitor surface contamination levels on pipes and various other items that are candidates for "free release". The measurements using this technology were compared with the manual probe and smear baseline technology on the basis of cost, speed, reliability and sensitivity.

During the demonstration, suspected clean items and items with low levels of contamination (less than 1000 dpm/100 cm^2) were surveyed with the IonSens™ system. The free release limit for uranium, 1000 dpm/100 cm^2, was used as the release limit for the demonstration since other radionuclides were never involved with the 321-M process.

To determine the sensitivity of the system, radioactive sources of known contamination levels were monitored.

Figure 2. Pipe Measurement

Demonstration Summary

Approximately 500 items weighing 2000 lbs were monitored by the IonSens™ system. The sizes and shapes of the items varied, but fit into one section of the pipe measurement chamber. A mesh tray supported items such as hand tools and short tubular pieces that were too small for the chamber's support system. Using this setup, multiple items were monitored during a single measurement cycle. Of the 500 items monitored, approximately 300 items, or 1000 lbs, were identified for free release based on uranium free release criteria. The 300 items included approximately 500 lbs of lead with contamination levels below free release levels. A manual free release survey confirmed the IonSens™ results.

An average measurement cycle for the IonSens™ system is six minutes. A cycle includes loading the measurement chamber, monitor time, and unloading the chamber. The IonSens™ system requires occasional standardization and background checks. The detector collector plates are sensitive to dirt and foreign matter, but if kept clean, are not high maintenance. Normal system operation requires little maintenance.

Preliminary data evaluation indicates the IonSens™ system is faster than hand surveying for larger items and multiple items run in a single measurement cycle. Single item measurements of small items may be longer than the time required to hand survey the item.

The minimum sensitivity of the system using one pipe measurement chamber was 500 dpm/100 cm^2. Planned improvements of the operating software are expected to lower the sensitivity level to 200 dpm/100 cm^2.

Benefits of the IonSens Ô Monitoring System

- Foremost advantage of the IonSens™ Monitoring System is the ability to survey areas such as the internal surface of pipe where hand probe and smears are not possible.
- Provides computer printout of surveys
- Faster than hand surveys of larger items

Future Applicability

Based on the data collected during the demonstration, the Health Physics Technology department at SRS is fully supportive of the IonSens™ system. The first phase of full acceptance will allow the system to be used as a screening tool to identify items for free release. Additional production experience will be needed for acceptance as an alternative to hand surveys. When operating software is available to measure contamination levels approaching the release levels of plutonium and other radionuclides, further evaluation will be made for those purposes.

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SAVANNAH RIVER SITE

321-M Fuel Fabrication Facility

Technology Post-Demonstration Fact Sheet

October 15, 1999

SIZE REDUCTION MACHINE

The Need

The 321-M Fuel Fabrication Facility was used to manufacture fuel elements for the site reactors for over 35 years. As a result of these activities, a significant number of areas and components were contaminated with uranium. Part of the deactivation project is to remove contaminated components in order to reduce contamination levels in these areas. To reduce waste disposal volumes, many of the larger pieces will need to be cut to improve disposal packaging. Conventional hand-held shears and portable saws subject the operators to early fatigue and possible accidents due to strain.

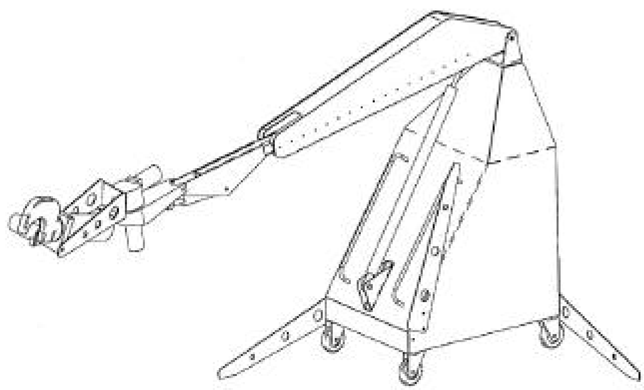

Figure 1. Isometric of Size Reduction Machine

Innovative Technology Description

The technology selected was a Size Reduction Machine (SRM) manufactured by Utility Engineering in partnership with Special Application Robotics. (Figure 1.) This equipment provided a non-robotic, manually moved machine that mounted a Champion hydraulic shear marketed by Mega-Tech Services, Inc. The machine is a mechanical assist device that takes the weight of the shear off the operator.

The counterweighted platform was moved and roughly aligned manually. The machine hydraulics and controls are mounted in the base unit, which controls the six axes of movement and the shear head cutter. A 20' tethered control panel controls all functions of the machine. The tether allows the control panel to be strategically placed for maximum visibility to the location being cut.

The machine is capable of shearing items from 1 foot below to 16-18 feet above floor level, and is capable of cutting within 4 inches of a wall or floor surface. Cutting in the overhead required only the use of a ladder to install rigging to lower the cut items. The shear has the capacity to cut stainless steel 3"x 3" angles; 4" schedule 40 pipes, and 4" x 3/8" channel. The dual hydraulic power pack uses standard 220/230 voltage single-phase power. A gripper device on the side of the shear head clamps the component being cut, centers and hold it square with the shear head. This also assists in keeping the cut item from falling. The machine fits through a standard 36" doorway and can be moved by two operators on a smooth level surface.

Baseline Technology

The baseline technologies that were used for comparison were a gasoline powered hydraulic ResQ hand held shear and standard hand held portable band saw using 100/120 voltage power.

Demonstration Description

The SRM was demonstrated and compared to the performance of the baseline technologies. Identical cuts were made by each method on loose and overhead items. The loose items ranged from light chairs to rolling carts made of stainless steel channel and angle (Figure 2). The overhead items ranged from to 3"x 3" carbon steel angle to 1 ½ carbon steel schedule 40 pipe.

The objectives of the demonstration were to show that the Size Reduction Machine

- increases production rates
- decreases costs associated with the size reduction of overhead items
- is safer to use (less chance of accident)
- is less fatiguing to the operator

Figure 2. Items To Be Size Reduced

Demonstration Summary

Items to be cut were first identified in the potentially contaminated overhead area of the 321-M building (Figure 3.). These included a plant and instrument air system with 1 ½ carbon steel piping, ¾ condensate piping, and an overhead lift rack consisting of 3" x 3" angle, support rods, and a unistrut trolley /rail system. Seventy-one cuts were made with each cutting method. The baseline technologies utilized a motorized scissors lift to access the cut location and move between cuts.

Using this lift greatly reduced the set-up time since the operators did not have to leave the lift to move between cuts. In addition they were able to hold the items being cut in lieu of rigging, and then lower the cut items directly by hand to the ground for disposal. Despite these two advantages, the Size Reduction Machine came out only marginally slower in overall unit cut time then the baseline methods. However there are other benefits attributed to the SRM. The SRM operators were less fatigued then the operators deploying the baseline methods since the lifting of the cutting tool overhead was eliminated. In addition, the SRM removed the operators from harm's way, by providing a standoff capability and thus reduced the potential for injury. Movement of the SRM however, is manual, and inherently has some injury potential in this step of the cutting.

Figure 3. Size Reduction Machine In Overhead Position

The cutting of loose items took place in the High Contamination Area (HCA) of the 321-M building. To help with decontamination at the end of the demo, the SRM was covered with poly except for the shear head and HEPA filter on the cooling fan inlet and exit filters. The operator running the machine control panel was dressed in one pair of protective clothing. The other operator kept the SRM supplied with items to be size reduced. This operator was located in an Airborne Contamination Area and was dressed in two pair of protective clothing and full-face respirator.

The loose items consisted of standard and rolling chairs and stainless steel carts. The SRM outperformed the baseline methods in the chair size reduction and performed as well as the portable band saw when cutting the stainless steel carts. (The hand held shear could not make the larger cuts in the stainless steel components and therefore could not be used for direct comparison.). Again the SRM operators benefited from not having to handle the cutting tool and not being in the immediate vicinity of the cut. The operator(s) at the shear end of the SRM only had to handle the material being cut and not the cutting tool itself. On the baseline technologies, the operators had difficulty operating the trigger switches on the hand held tools since they were required to wear two pair of gloves. The control panel for the SRM has 3 large joysticks and oversized push buttons that allow it to be operated with gloves. The SRM was successfully decontaminated upon completion of the demonstration to free release including the shear head.

Benefits of the Size Reduction Machine

- Similar speed in cuts/ hour to the baseline
- Less fatiguing to operators
- Safer, removes operators from harm's way

- Cuts larger items faster
- Easier to use when dressed out in protective clothing

Future Applicability

The SRM can be used wherever size reduction or removal of components is required. It should not be considered a stand-alone cutting device and should be used in conjunction with a baseline tool to get the most flexibility and production from it. It would be especially useful in overhead pipe and component removal jobs where safety of the operators is important. It could be very useful in the reduction of components in a radiological area since it is easy for an operator with two pair of gloves to control. Access to small areas through standard doorways does not present a problem.

Contact Persons

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LSDDP 321-M

SAVANNAH RIVER SITE

321-M Fuel Fabrication Facility
Technology Post-Demonstration Fact Sheet
August 27, 1999

STRIPPABLE COATINGS FOR DECONTAMINATION

Figure 1. Spray application of strippable coatings.

Need Description

Residual contamination is often non-adherent, and can lead to an airborne activity problem. For D&D projects, there is no guaranteed ability to process liquid waste. There is a consequent need for a technology to remove surface contamination without producing liquid secondary waste.

Innovative Technology Description

The *ALARA™ 1146 Cavity Decon* is a strippable coating technology used for the decontamination and immobilization of surface contamination. It is a vinyl based coating approved for the decontamination of reactor cavities during reactor outages. Applied by spraying, brushing, or rolling, the coating migrates into micro-voids of surfaces to contact contaminants.

During a 24-hour curing, the coating mechanically locks the contaminants into a polymer matrix. After curing the coating is easily peeled or stripped from the surfaces and produces a solid waste that is compactible and incinerable. The *ALARA™ 1146 Cavity Decon* is non-toxic and does not contain volatile compounds or heavy metals.

The *ALARA™ 1146 Cavity Decon* strippable coating also provides a durable coating that can be used to immobilize surface contamination or protect surfaces from contamination during D&D operations.

Baseline

The baseline technology is the Kelly Decontamination System. The Kelly system uses superheated water as a decontamination agent. The system can be used with either a spray wand or a vacuum shrouded spray head suitable for floors, walls, ceilings, and other flat surfaces. The vacuum shrouded head recovers the liquid and contaminants and passes them through a liquid separator. A demister, and high efficiency particulate air (HEPA) filter removes contaminants and discharges clean air to the environment. The separated solid and liquid are secondary waste streams.

Demonstration Summary

As the final phase of an investigation of strippable coatings conducted by Florida International University's Hemispheric Center for Environmental Technology, six commercially available strippable coatings were assessed at the 321-M Fuel Fabrication Facility. The coatings were applied side-by-side to the same type of surfaces under similar radiological conditions. Data on application, appearance, removal, decontamination factors, waste, and durability was collected to evaluate the overall performance of each coating. As a result of the assessment, the *ALARA™ 1146 Cavity Decon* strippable coating was selected for a demonstration.

Approximately 2845 sq ft of wall and floor area were coated with the *ALARA™ 1146 Cavity Decon* in the Machining Room, Log Storage Room and the Casting Room Cooling Hut of Building 321-M.

The surfaces were painted and unpainted carbon steel and painted concrete. For the surfaces that had the highest contamination levels, Decontamination Factors (DF) up to 7.2 (alpha) and up to 3.9 (beta/gamma) were achieved. The DF was lower for less contaminated surfaces, as would be expected.

Preliminary analysis indicates that the DF's, productivity rates, and costs of the *ALARA™ 1146 Cavity Decon* are comparable to the Kelly Decontamination System but the strippable coating does not generate a secondary liquid waste.

Seventy gallons of coating were applied during the demonstration. Actual coverage of the coating was approximately 40 ft^2/gal. Application rate was approximately 0.3 gal/min.

Figure 2. Removal of strippable coating.

The inside surfaces of the casting furnace enclosures were coated with the *ALARA™ 1146 Cavity Decon* as a fixative to reduce potential of airborne contamination. Portions of walls and floors were also covered to reduce the spread of contamination during future work activities. The coatings in these areas were not stripped, but left in place.

A comprehensive assessment of the *ALARA™ 1146 Cavity Decon* strippable coating, as demonstrated at the 321-M facility, is provided in the Innovative Technology Summary Report (ITSR). The ITSR is expected to be available in early FY00.

Figure 3. Coating on Furnace Enclosure for Contamination Control.

Benefits of Strippable Coatings

- Eliminates liquid waste
- Reduces solid waste – dried coating can be incinerated
- Immobilizes surface contamination
- Adheres to and easily removable from complex surfaces and components
- Rapid application and removal

Future Applicability

The *ALARA™ 1146 Cavity Decon* will be used for decontamination and immobilization of contaminants in the contamination area of 321-M. The FDD central decon facility is using the *ALARA™ 1146 Cavity Decon* strippable coating for decontamination and contaminant control in their decon cells.

Contacts:

For more information on strippable coatings, visit HCET's website at http://www.hcet.fiu.edu/pdf/hcet98_cd/y7strip.pdf
For more information on the LSDDP and this demonstration, visit the SRS website at http://www.srs.gov/general/srtech/lstd/index.htm

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APPENDIX C

321-M Deactivation LSDDP Communication Plan

BACKGROUND

Introduction

The Savannah River Site (SRS) is partnering with the DOE Office of Science and Technology (EM-50) and the DOE Office of Nuclear Material and Facility Stabilization (EM-60) in a Large Scale Demonstration and Deployment Project (LSDDP) in the 321-M Fuel Fabrication Facility. The Decontamination and Decommissioning Focus Area (DDFA) of EM-50 is responsible for developing, demonstrating, and implementing cost-effective and safe technologies to deactivate and decommission excess facilities within the DOE complex. The National Energy Technology Laboratory (NETL) in Morgantown, West Virginia is the lead field site for the DDFA.

The LSDDP concept integrates field demonstrations of innovative or improved technologies into an existing project to compare the new technologies against baseline technologies under the same field conditions. Those technologies that complete a task faster than the baseline, at less cost than the baseline, and/or better than the baseline technology will be considered for deployment at SRS in future D&D projects. In addition, the goal of the LSDDP is to publicize successful technologies for further use within the DOE complex and the commercial nuclear industry.

Facility Background

The 321-M facility is a 62,000 square foot building that was used to manufacture fuel and target assemblies for irradiation in the Savannah River Site production reactors. The metallurgical processes required casting furnaces, extrusion presses, and associated mechanical processing equipment. Ventilation ducts, processing systems, and to a lesser extent approximately 9,000 ft^2 of facility space is contaminated with highly enriched uranium.

The facility is currently in a post-shutdown surveillance and maintenance (S&M) phase. A project has been established and funded by EM-60 to deactivate the facility and place it into a stable, passively-safe configuration requiring minimal surveillance and no maintenance. The LSDDP and subsequent deployments of technology are expected to benefit the deactivation project by reducing costs of selected deactivation activities, reducing their duration, or enhancing their effectiveness. This in turn will reduce the overall residual cost of caretaking for the facility until it can be decommissioned.

Project Management

The 321-M Facility is part of the Savannah River Site Excess Facility Disposition Program and is managed by the Department of Energy Savannah River Site (DOE-SR). As the SRS Management and Integrating contractor for the Department of Energy, Westinghouse Savannah River Company (WSRC) is responsible for managing the LSDDP and will be the administrating contractor for the LSDDP.

An Integrating Contractor Team (ICT) will support the LSDDP. The ICT will be composed of representatives from organizations whose areas of expertise will support the objectives of the technology demonstrations. Members of the 321-M ICT include NES Inc., Duke Engineering and Services, Florida International University, DOE-SR, WSRC, and the US Army Corps of Engineers for performance measurement parameters and cost assessment. The role of the ICT is to research, assess, recommend, and approve all technologies for full-scale demonstration. It will also establish the scope and appropriateness of each demonstration, provide input to the analysis of each technology demonstrated, and assist in the reporting of results.

Technology Selection

The ICT will identify technologies with the potential to solve the problems and needs of the deactivation project. Technologies will be objectively assessed with consideration given to technology maturity, cost of the demonstration, applicability to the facility on a scale large enough to yield a meaningful demonstration, applicability to other sites, vendor cost sharing, and the ability to support the baseline deactivation schedule. Successful technologies should demonstrate benefits that include, but are not limited to:

- Lower life-cycle costs
- Lower health and safety risks to the worker and public
- Lower risks to the environment
- Waste minimization
- Reduced facility hazard level and category of waste
- Increased reuse of materials and/or free release of materials for recycle
- Reduced worker exposure and costs during future facility maintenance
- Reduced scope of work for eventual decommissioning of the facility
- Acceleration of the project schedule

Once technologies are selected for demonstration, subcontracts will be awarded using a competitive bid process. Some unique technologies may require sole source purchase. After the technology selection process, a demonstration test plan will be prepared for each technology identifying the scope of work for the test, the performance measures for the test, the data quality objectives (DQO's), and the baseline technology to which the innovative/improved technology will be compared.

To the extent practical, original baseline technologies will be demonstrated as a side-by-side comparison with the innovative/improved technologies. NETL has contracted with the US Army Corps of Engineers to complete a comprehensive cost analysis and to define objective performance parameters of each technology demonstrated under the LSDDP. The Army Corps of Engineers will be included in the preparation of the demonstration test plan to ensure that their data collection requirements are met. The ICT and WSRC will evaluate data collected on the demonstrations in a coordinated effort with the Army Corps of Engineers. WSRC will report the results and recommendations via the reporting media listed below.

COMMUNICATION STRATEGY

One of the goals of the LSDDP is to disseminate information collected during the technology demonstrations so promising innovative/improved technologies will be advertised and used in other D&D projects throughout the DOE complex. Information dissemination will not be limited to the DOE community. Emphasis will be placed on passing information to the general industry and publicizing successful technologies.

LSDDP Internal Communication

In order to successfully complete the technology demonstrations, a large amount of information will have to be transferred among the participants. All avenues of modern communications technology will be used. This includes telephone, fax, electronic mail, express delivery services, and paper mail. To regulate the flow of information and to ensure that all LSDDP participants receive all the necessary information, much of the communications will be structured as follows.

Face-to-face Meetings – To minimize the expense, these meetings will be held on a quarterly frequency or less. However, to get off to a good start and to optimize the face-to-face interactions, the first two meetings were only about two months apart.

Standardized Formats – The information used to screen candidate technologies will be reported in a standardized way on "LSDDP Technology Screening Forms". The standard format imposes a consistent basis for reviewing one technology against another.

Teleconferences – On regular occasions between the face to face meetings, multi-party teleconferences will be held to continue detailed discussions.

Electronic mail – A contacts list was developed, and much of the information will be passed electronically, by email. This includes screening forms, drafts of written reports, meeting minutes, and vendor information.

"External" LSDDP Communication

The following avenues will be used to provide technology demonstration results to DOE and the general public:

Internet Web Page

The 321-M LSDDP will be a part of the SRS homepage (http://www.srs.gov) and may include the following documents:

- Descriptions of Facility, Project Organization, and Method of Participating
- Monthly Status Reports
- ICT Members (Names, Contact Information) with links to their home organization web pages
- Requests for Proposals
- Technology Fact Sheets
- Innovative Technology Summary Reports (ITSR)
- Technology Selection Criteria
- Project Reviews
- Technology Performance and Cost Data

The web page will be updated on a regular basis and include current project information. Hot links will be established with the following homepages:

- DDFA Home Page http://www.wpi.org/doe/focus/dd
- NETL Home Page http://www.NETL.doe.gov
- OST Home Page http://em-50.em.doe.gov
- SRS STCG Home Page

Project Reporting

Project status reporting is provided via several monthly reports. The Progress Tracking System (PTS) reports are sent to DOE-HQ to provide a monthly status of project progress. Monthly reports will be issued to NETL and summarized in their DDFA updates. Onsite reporting includes updates at STCG meetings and D&D technology team meetings. For those months when the ICT does not meet, teleconferences will be conducted by team members.

Video Recording of Technology Demonstrations

Portions of the technology demonstrations will be videotaped and used in the overall communications strategy for the project. The videos may be used in the various presentations referenced in this document. A videotaped final report will be prepared at the end of the LSDDP.

Written Publications

Each technology demonstrated will have a Test Engineer assigned to interface with the vendor. The Test Engineer will design the demonstration program and interact with vendor personnel to ensure the demonstration is performed as planned and the appropriate performance data are collected. The Test Engineer will produce the first draft of the technology fact sheets and the innovative technology summary reports.

A single individual with technical background and experience producing technical reports will be assigned to rewrite all first drafts. This will ensure that the written documents are in a consistent voice and style, and consistently present the results of the demonstrations. The technical editor will coordinate the production of the following documents.

- Technology Fact Sheets

  A Technology Fact Sheet is a one or two page summary of technology selected for demonstration. The summary includes the technology need, baseline and innovative/improved technology descriptions, demonstration description, and key personnel contacts. Fact sheets will be prepared before the beginning of the demonstration for each technology selected, and revisions will be prepared at the end of the demonstration. Fact sheets will be included on the LSDDP home page. NETL will distribute paper copies.

- Innovative Technology Summary Report (ITSR)

  ITSRs are detailed reports that are 20-30 pages in length and include in-depth descriptions of the technology performance as demonstrated in the LSDDP. The ITSR includes information useful to users who may want to evaluate technologies for future use. ITSRs will be completed after each technology demonstration is complete. A detailed description of the technology, performance data, costs analysis, and lessons learned are included in the ITSR. A draft ITSR will be submitted to the ICT members and DDFA in accordance with the 321-M deactivation/LSDDP integrated schedule. The final ITSR will be provided to the DDFA within 30 days after the draft review is completed.

Deactivation and Decommissioning Focus Area Mid-year Reviews

LSDDP status and progress will be presented to a peer review panel at mid-year reviews held by NETL in Morgantown, WV. The review will describe the status of the project and include major accomplishments and lessons learned.

Conference Papers

Presentations of the LSDDP information at selected conferences and forums will provide a source for sharing technology demonstration results with other DOE sites and the commercial sector. Information will be presented via technical papers, poster sessions, and exhibition booths.

Savannah River Site Citizens Advisory Board

The Citizens Advisory Board is a citizens group formed to reflect the cultural diversity of the population affected by SRS. Members represent the local business community, local government, environmental and special interest groups, and the general public. The Board provides advice and recommendations to the U. S. Department of Energy, the U. S. Environmental Protection Agency Region IV, and the South Carolina Department of Health and Environmental Control on waste management, environmental remediation, and other related issues. Periodically the Board will be advised and updated on the progress and results of the LSDDP.

SRS Site Technology Coordination Group

The SRS Site Technology Coordination Group's (STCG) prime focus is to ensure that the best technologies are applied to the environmental management problems at SRS. The STCG works to ensure that implemented technologies are responsive to customer needs, achieve compliance with regulatory requirements, are acceptable to the public, and achieve cost savings. The STCG assists the SRS line organizations by facilitating the identification and prioritization of site technology.

The STCG will be updated at their monthly meeting concerning the status and progress of the technology demonstrations. Input from the STCG membership will be considered in the selection of technologies for demonstration.

Responsible Persons

Name	Organization	Area of Responsibility	Telephone	FAX	E-Mail
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Victor Fricke	WSRC - FDD	Web pages, technical editing	(803)725-5760	(803) 725-4095	vic.fricke@srs.gov
Jeff Lee	WSRC Principal Investigator	ICT Coordination	(803)725-0652	(803) 725-4095	jeffryw.lee@srs.gov
Cecil May	WSRC Principal Investigator	Coordination with other SRS organizations	(803)725-5813	(803)725-4704	cecil.may@srs.gov

Schedule of Communications Events

<u>Time</u>	<u>Item</u>
April 1988	Teleconference to establish ICT
April 1998	ICT initial meeting
May 1998	Two teleconferences
June 1998	Set up SRS 321-M LSDDP web page
June 1998	Second ICT Meeting – screening of technologies
June 1998	Teleconference to continue screening technologies
July 1998	Two teleconferences to continue screening technologies
August 1998	Complete selection of candidate technologies
November 1998	Start demonstration of first technology
November 1998	Issue Fact Sheet for first technology
2nd quarter FY99	Hold Open House
May 1999	Issue ITSR for first technology demonstration
September 1999	Complete technology demonstrations
December 1999	Issue final ITSR for last demonstration
December 1999	Issue final LSDDP report

end/